

#10  
on Review  
Test III

$f(x) = \log_3(x+4)$     $f^{-1}(x) = ?$

$y = \log_3(x+4)$   
 $x = \log_3(y+4)$

$3^x = y+4$   
 $3^x - 4 = y$

$f^{-1}(x) = 3^x - 4$

4-23-19

Math 2311 Pg 1  
Precal - Palmer

Section 3.5

Solving exponential and log equations

Exponential Equations:

• one-to-one property - Bases are the same then set the exponents equal to each other and solve for "x". (for only one base on each side)

ex)  $2^3 = 2^x$   
 $3 = x$

ex)  $7^{x-2} = 7^{3x+5} \rightarrow x-2 = 3x+5 \rightarrow -2x = 7 \rightarrow x = -7/2$

ex)  $3^{2x-5} = \frac{1}{27} \rightarrow 3^{2x-5} = 3^{-3} \rightarrow 2x-5 = -3 \rightarrow x = 1$

ex)  $(\frac{1}{8})^{x-4} \cdot 2^{5x+1} = (\frac{1}{16})^x \rightarrow (2^{-3})^{(x-4)} \cdot 2^{5x+1} = 2^{(-4)(x)}$   
 $2^{2x+13} \cdot 2^{-4x} = 2^{-3x+12} \cdot 2^{5x+1} = 2^{-4x}$   
 $2x+13 = -4x \rightarrow 13 = -6x \rightarrow \frac{13}{6} = x$

• no common base

ex)  $3^x = 7$  use ln form

$\ln(3^x) = \ln(7)$   
 $x \ln(3) = \ln(7)$   
 $\frac{x \ln(3)}{\ln(3)} = \frac{\ln(7)}{\ln(3)}$

$x = \frac{\ln(7)}{\ln(3)}$

ex  $5 \cdot 6^{4x-2} = 20$

$$\frac{5 \cdot 6^{4x-2}}{5} = \frac{20}{5}$$

$$6^{4x-2} = 4$$

$$\ln(6^{4x-2}) = \ln(4)$$

$$\frac{(4x-2)(\ln(6))}{\cancel{\ln(6)}} = \frac{\ln(4)}{\ln(6)}$$

$$4x-2 = \frac{\ln(4)}{\ln(6)} + 2$$

$$\frac{4x}{4} = \frac{\frac{\ln(4)}{\ln(6)} + 2}{4}$$

$$x = \frac{\frac{\ln(4)}{\ln(6)} + 2}{4}$$

①  $3^x = 3^2$   $x=2$

②  $7^{2x-1} = 7^{3x+5}$

$$2x-1 = 3x+5$$

$$-6 = x$$

③  $2^{3x} = 16$   $2^{3x} = 2^4$

$$3x = 4$$

$$x = 4/3$$

④  $25^x = \frac{1}{125}$

$$25^x = \frac{1}{125}$$

$$\ln(25^x) = \ln\left(\frac{1}{125}\right)$$

$$x \ln(25) = \ln\left(\frac{1}{125}\right)$$

$$x = \frac{\ln\left(\frac{1}{125}\right)}{\ln(25)}$$

⑤  $\frac{1}{9} \cdot 3^{4x-1} = \left(\frac{1}{27}\right)^x$

$$3^{-2} \cdot 3^{4x-1} = 3^{-3x}$$

$$3^{-3+4x} = 3^{-3x}$$

$$-3+4x = -3x$$

$$-3 = -7x$$

$$3/7 = x$$

⑥  $\frac{8^x}{2^{x+1}} = \frac{1}{4}$

$$2^{x+1} = 4 \cdot 8^x$$

$$2^{x+1} = 2^2 \cdot 2^{3x}$$

$$2^{x+1} = 2^{2+3x}$$

$$x+1 = 2+3x$$

$$-1 = 2x$$

$$-1/2 = x$$

⑦  $\log(x-2) = \log 4$

$$e^{\log(x-2)} = e^{\log 4}$$

$$x-2 = 4$$

$$x = 6$$

⑧  $\log_3(2x+1) = \log_3(x-5)$

$$2x+1 = x-5$$

$$x = -6$$